

Amendments to the Drawings:

The drawing sheet attached in connection with the above-identified application containing Figures 2-3 are being presented as a new formal drawing sheet to be substituted for the previously submitted drawing sheet. The drawing Figure 3 has been amended. Appended to this amendment is an annotated copy of the previous drawing sheet which has been marked to show changes presented in the replacement sheet of the drawing.

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Status of Claims:

Claims 1, 13, 17, and 30 are amended. Claims 41 and 42 are added as new claims. Thus, claims 1-42 are presented for examination.

Drawing Objections:

In paragraph 4 of the office action, the Examiner objected to the drawings for failing to include every feature of the invention specified in the claims.

In view of the amendments to the drawings, the Examiner's drawing objection is respectfully traversed.

Figure 3 of the current application is amended to include a dashed line, identified by the numeral 200, between the substrate 104 and write pole 100.

The amendment to the drawings is fully supported by the specification and adds no new matters. The dashed line identified by the numeral 200 indicates the location where a layer of material between the substrate 104 and write pole 100 may be formed. The original specification states that "a good electrical or heat conductive material may be used between the substrate and the facing surface of the write pole." (See page 16, lines 18-20 of the specification.) The specification is also amended accordingly to identify the "good electrical or heat conductive material" by the numeral 200.

In light of the current amendments to Fig. 3, it is submitted that the drawings illustrate every feature specified in the claims and therefore are fully compliant with 37 CFR 1.83(a).

Claim Restrictions:

In paragraphs 2 and 3 of the office action, the Examiner withdrew claims 3-7, 14-16, 19-29, and 36-38 from consideration for being drawn to a non-elected species.

The Examiner's withdraw of the above-referenced claims from consideration is respectfully traversed.

For claims 3 and 19, the examiner states that Fig. 3, the elected species, illustrates that the write shield is separate from the read shields. The applicant acknowledges that Fig. 3 illustrates the write element as physically separated from the read shields by an insulation material 102. However, claims 3 and 19 recite that the write pole is "magnetically connected" to the read shield. While discussing Figure 3, the specification describes that the write head is physically spaced from the read shield such that "the majority of the return field is returned to the SUL from the write shield 92 rather than through the first and second read shields 94 and 98, however, a portion will return through the read shields." (See page 15, lines 16-18 of the current application.) This is commonly known to those skilled in the art of making read/write heads for disk drives that physical contact is not required for the conduction of magnetic flux between two closely spaced magnetically conductive objects. The feature of a magnetic connection between the write element and read shield as recited in claims 3 and 19 is not dependent on a physical connection, and hence is generic to both Figs. 2 and 3. Therefore, it is submitted that claims 3 and 19 are within the scope of the elected species of Fig. 3.

For claims 14-15, 25-26, and 36-37, the examiner states that Fig. 3, the elected species, does not illustrate a layer of material between the write element and substrate. As previously discussed, Fig. 3 is amended to illustrate the location of this layer. Therefore, it is submitted that claims 14-15, 25-26, and 36-37 are within the scope of the elected species of Fig. 3.

Therefore, it is submitted that claims 3-7, 14-16, 19-29, and 36-38 are generic or drawn to an elected species (Fig. 3) and should be considered along with the other claims in the current examination.

Claim Rejections under 35 U.S.C. 112:

In paragraphs 5-6 of the office action, the Examiner rejected claim 17 under 35 U.S.C. 112, second paragraph. Specifically, the Examiner pointed out that the feature of “the magnetoresistive sensor” lacks sufficient antecedent basis.

In light of the current amendments, the above-referenced rejections are respectfully traversed. Claim 17 has been amended to recite the element of “a magnetoresistive sensor”, and therefore complies fully with 35 U.S.C. 112, second paragraph.

Prior Art Rejections:

Claims 1-2, 8-11, 17-18, 30-33, and 39-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Gage et al. (U.S. Patent No. 6,762,977.) Claims 12 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gage. Claims 1-2, 8-11, 13, 17-18, 30-33, 35, and 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lairson et al. (U.S. Patent No. 5,822,153.). These rejections are respectfully traversed, in view of the claims as amended herein and the following remarks.

As amended, independent claim 1 recites a read/write head for a disk drive with the feature of “the read element comprises a read shield magnetically connected to the write element.” The specification describes a spacing relationship between the write element and read shield such that some magnetic flux from the write element is conducted through the read shield. (See page 15, lines 11-21.) By spreading out the return path of the magnetic flux over a larger surface area, it becomes less likely that the return magnetic field would cause inadvertent changes to the recording media. (See page 14, lines 11-18.) Neither this feature nor its advantages are described or suggested by Gage or Lairson.

Gage merely specifies that the write top pole 44 and bottom read shield 50 are separated by an alumina overcoat layer 46. There is no teaching or suggestion by Gage to magnetically connect the write top pole 44 and read shield 50. Per MPEP 2131, to anticipate a claim, the reference must teach every element of the claim. Because Gage does not teach the element of a magnetic connection between the write element and read shield, it is submitted that Gage does not anticipate claim 1.

Similarly, Lairson also does not teach or suggest the feature magnetically connecting the write element and a read shield. As shown in Fig. 1, Lairson describes having multiple insulating layers separating the write pole 42 and read shield 60, including a layer of diamond-like carbon (DLC) 66 and a layer of alumina 67. Further, Lairson does not provide a motivation to space the write element and read shield such that some magnetic flux is conducted to the read shield. Accordingly, the Lairson reference cannot serve as a *prima facie* evidence of obviousness under 35 U.S.C. 103, and therefore claim 1 is patentable over Lairson.

Therefore, it is submitted that claim 1 is patentable over both Gage and Lairson. Independent claims 19 and 30 contain a similar feature of the write element being magnetically connected to a read shield, and therefore are allowable over Gage and Lairson for the same reasons as those stated above for claim 1. Claims 2-12, 14-18, 20-29, 31-41 are dependent claims of claims 1, 19, and 30, and therefore are deemed allowable for at least the same reasons as those stated above for claims 1, 19, and 30.

Furthermore, dependent claims 7, 12, 23, and 34 recite the feature that “the distance from the write pole to the soft underlayer falls within a range from approximately equal to half the distance from the nearest read shield to the write pole to approximately twice the distance from the nearest read shield to the write pole.” This feature is neither described by nor suggested by Gage.

In paragraph 10 of the office action, the Examiner states that it would have been obvious to one of ordinary skill in the art to configure the system with the listed distance relationship, and

that the distance relationship could be derived through “routine experimentation and optimization.” However, Gage does not provide the motivation to derive this distance relationship. The distance relationships recited in claims 7, 12, 23, and 34 are the result of a balancing of countervailing factors not considered or suggested in Gage.

As discussed above, the current application describes the spacing between the write element and read shield such that a portion of the magnetic flux from the write element is conducted through the read shield. (See page 15, lines 11-21.) By spreading out the return path of the magnetic flux over a larger surface area, it becomes less likely that the return field would cause inadvertent changes to the recording media. (See page 14, lines 11-18.) However, the spacing cannot be too close as to induce reader instability when too much magnetic flux from the write element is conducted to the read shield. (See page 15 line 22 – page 16 line 1.) These considerations and motivations are not described or suggested by Gage; hence a person skilled in the art practicing the teachings of Gage would not be able to arrive at the claimed distance relationship just through “routine experimentation and optimization”, as the Examiner stated in the office action. Per MPEP 2142, a 35 U.S.C. 103 rejection requires some motivation or suggestion to modify the reference teaching. Gage offers no such motivation or suggestion. Therefore, it is submitted that claims 7, 12, 23, and 34 are allowable for the features of the distance relationships between the write pole and read shield, in addition to the reasons stated above for the independent claims.

Independent Claim 13 recites a read/write head with the feature of “wherein the write element is formed directly on the substrate.” This feature is neither suggested by nor described by Gage or Lairson. Further, this feature is inherently incompatible with the teachings of Gage and Lairson. The Examiner states on page 7 that this feature “has no operational significance.” The applicant respectfully disagree. As described in the specification, placing the write element directly on the substrate provides the advantages of “enhancing the ability of electrical charges to dissipate to ground through the substrate and enhancing heat dissipation from the write element

through the substrate.” (Specification, page 16, lines 16-18.) Therefore, this feature does have operational significance.

Gage teaches forming a laser section 30 on a laser substrate 32 (such as GaAs), between the substrate 32 and the write pole 42. Hence, if the write pole is formed directly on the laser substrate 32, such a configuration would prevent forming a laser section 30 on the laser substrate 32. Hence, Gage teaches away from forming the write element directly on the substrate.

Lairson teaches forming a read/write head on a substrate such that the write element is protruding and the read element is recessed. (See Lairson, Fig. 1.) During operation, the write element is “virtually in contact with the disk.” (See Lairson, col. 4, lines 4-10.) Therefore, the write element must be encased with a “durable material” to provide physical support for the protruding write element while contacting against the disk surface. (See Lairson, col. 5, lines 1-9.) As illustrated in Fig. 1 of Lairson, the write element 44 is separated from the substrate by a layer of DLC (diamond-like carbon) 68, a solid mixture of carbon, nitrocarbon and hydrocarbon. (Id.) Hence, Lairson teaches away from forming the write element directly on the substrate because such a configuration conflicts with the requirement of encasing the write element in a durable encasement material as required by Lairson.

Because neither Gage nor Lairson teach the feature of forming the write element directly on the substrate, or provide any motivation to do so, it is submitted that claim 13 is allowable over Gage and Lairson. Claims 24 and 35 are dependent claims of claim 19 and 30, respectively, and recite a similar feature of the write element formed in direct contact of the substrate as claimed in claim 13. Therefore, claims 24 and 35 are allowable for the reason stated above for claim 13 in addition to the reasons stated above for independent claims 19 and 30.

Claim 42, a dependent claim of claim 13, recites the feature of “a region of insulating material separates a tip of the write pole from the substrate.” This feature is neither described by nor suggested by the Gage and Lairson references. This feature is illustrated in Fig. 3 of the current application, where the bottom tip of the write element 10 angles away from the substrate

104 and is separated from the substrate 104 by the insulating material 102. It is commonly known to those skilled in the art of manufacturing read/write heads for disk drives that the tip of the write element should have a small surface area facing the ABS (air bearing surface) for the purpose of concentrating the magnetic flux to cause changes to the magnetic storage state of the disk. Hence, if the write element is formed directly on the substrate, there is a risk that the magnetic flux density is reduced through the substrate. The configuration illustrated in Fig. 3, where the tip of the write element 10 is separated from the substrate 104 by a region of insulating materials 102, prevents a diffusion of magnetic flux while still providing the benefits of enhancing electrical charge dissipation and heat dissipation, as described above in reference to claim 13. This feature is not shown in Gage or Lairson, and therefore claim 42 is allowable for this reason in addition to the reason stated above for claim 13.

Claim 41, a dependent claim of claim 1, recites the limitation that “wherein a single uniform layer of insulating material separates the write element and read element.” This further distinguishes over Lairson, where a layer of diamond-like carbon (DLC) 66 and a layer of alumina 67 separates the write element and read element.

Conclusion:

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-0872. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-0872. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-0872.

Date

October 16, 2006

FOLEY & LARDNER LLP
Customer Number: 23392
Telephone: (310) 975-7963
Facsimile: (310) 557-8475

Respectfully submitted,

By

Ted R. Rittmaster
Attorney for Applicant
Registration No. 32,933